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# Mating Vigour and Sexual Competitiveness of Chemosterilized Males of *Dysdercus cingulatus* Fabr

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**Mating Vigour and Sexual Competitiveness of Chemosterilized Males of *Dysdercus cingulatus* Fabr.** Islam AHMAD\* (Department of Zoology, Aligarh Muslim University, Aligarh, India) Received April 19, 1971. *Botyu-Kagaku* 36, 99 (1971).

13. アカホシカメムシ不妊化雄の交尾時の活性と競争 Islam AHMAD (Department of Zoology, Aligarh Muslim University, Aligarh, India) 46. 4. 19. 受理

交尾に際して、化学不妊剤で不妊化した雄の活性と正常の雄との競争について観察した。Apholate 処理した雄は正常雄と同様に、交尾に際して活性があった。5匹の雌に5匹の正常雄と5匹の不妊化雄を入れて、交尾させた所46.8%の不妊化率を示した。この値は、予測された理論値50%に非常に近い。一方、5匹の雌に10匹の正常雄と5匹の不妊化雄を入れた交尾試験では29.0%の不妊化率で、やはり理論値33.3%に近い値を与えた。

これによって、不妊化雄は、交尾に際しての活性は、正常雄に比して劣ることなく、競争して交尾していることがわかる。

Prior to the release of sterile males for the control of an insect species in nature, it is necessary to study the effects of the sterilizing agents on the mating vigour and sexual competitiveness of such males. Any deficiency in the mating potentiality of sterile males as compared to the normal ones is likely to fail the whole attempt. This factor has, therefore, been studied by several workers but the result obtained are quite conflicting. The commendable success achieved in the eradication of Screw-worm fly from Curacao island (Baumhover, *et al.*, 1955) is itself a proof of the fact that the irradiated males are almost equally vigorous to the normal ones. Davis, *et al.*, (1959) found the irradiated males of *Anopheles quadrimaculatus* to be vigorous but those of *Musca domestica* were found to be equally potent when treated with the chemosterilants (Schmidt, *et al.*, 1964). A significant loss in the mating vigour of the chemosterilized males of *Aedes aegypti* was, however, observed by Dame, *et al.* (1964).

It seems that the effects of sterilizing agents are more or less specific and need a fuller study before larger programmes are undertaken in the field. With this view the mating vigour and sexual competitiveness of apholate treated males of *Dysdercus cingulatus* was investigated.

## Materials and Methods

### *Test insect and Chemical*

The insects during the present studies were obtained from a normal strain of *D. cingulatus* that is being maintained in the Laboratory since 1964. They were kept at a temperature of  $29 \pm 1^\circ\text{C}$  and were reared on water soaked cotton seeds.

The alkylating agent, apholate was obtained through the courtesy of Dr. A. B. Borkovec, in charge, Chemosterilant investigations, USDA, Beltsville, Maryland.

### *Experimental Procedure*

The freshly emerged males of *D. cingulatus* were exposed to glass surfaces, residually treated with apholate at the rate of 3.54mg/sq. inch for two hours. The treated males were confined in the rearing jars along with the normal males and females of the same age and were given water soaked cotton seeds as daily food. The ratio of normal and sterilized males varied in each jar. As mating starts after three to five days of emergence and the females lay the first batch of eggs about three days thereafter, observations on the egg batches and the number of eggs per batch were recorded for eight days. Each batch was kept separately and hatch rate was determined. Presuming that the treated males were as competitive as the normal ones, the expected % sterility was calculated on the basis of proportion

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Table. 1. Sexual competency of male *D. cingulatus* treated with apholate

Type of mating	No. of eggs obtained	No. of eggs hatched	% sterility expected	% sterility observed
5 : 5 : 5*	543	258	50.0	46.8
5 : 10 : 10	875	554	33.0	29.08
5 : 10 : 15	927	545	33.0	34.2
10 : 5 : 15	898	303	66.0	62.1
5 : 5 : 10	743	206	50.0	68.9
5 : 0 : 5	570	12	100.0	97.5

\* The figures indicate the number of sterilized males, normal males and normal females in each mating.

of sterilized males and normal males and was compared to the % net sterility actually obtained.

### Results

The results (Table 1) clearly show that *D. cingulatus* does not lose any vigour when treated with apholate and the sterilized males are as competitive as the normal ones. This was evident when the expected sterility was compared with the sterility actually obtained. In a test where five females were caged with five normal and five sterilized males the % net sterility was 46.8 as against an expected sterility of 50.0%. In another series of tests where normal males were double in number than the sterilized ones and expected sterility was 33.3%, the net sterility was 29.0% and 34.2%. When the ratios of the treated and normal males were reversed, 62.1% sterility was obtained. These observations do not depart significantly from the theoretical calculations and suggest that treatment with apholate has no effect on the mating potentialities of the males.

A clear cut distinction could be drawn between the hatch rate of the eggs obtained from females supposed to have mated with normal males and sterilized males. In the former case the hatch rate always exceeded 80% whereas in the latter it was below 6.5%. However, there were two instances where the egg batches showed intermediate rate, 43.4% in one case and 21.1% in another. This may have been due to the mixing of sperms from treated and normal as multiple mating is not uncommon in this species. Dame, *et al.* (1964) observed practically similar phenomenon in *Aedes aegypti*, whereas an increased hatch rate

was obtained in the eggs laid by females that were first mated to treated males and then to untreated males.

### Summary

The mating vigour and sexual competitiveness of chemosterilized males was observed. It was found that the apholate treated males were as competitive as the normal ones. It was evident from the fact that when five females were caged with five normal and five sterilized males, the % net sterility was 46.8 which is very close to the expected sterility of 50%. In another tests where the normal females were double in number than the sterilized one, the expected sterility was 33.3% while the sterility actually obtained was 29.0 and 34.2%. It shows that the treatment of apholate does not affect the mating vigour of the males and they are as competitive as the normal ones.

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